INTEGRATED PEST MANAGEMENT PRACTICES FOR PACIFIC SHELLFISH PRODUCTION
Project No: 5358-63000-002-00D

The West coast shellfish culture industry represents oyster, clam and mussel growers from Alaska to California and generates an estimated $100 million dollars in gross annual sales. Nevertheless, domestic production does not meet national demand and this trade imbalance is expected to grow. Oysters are farmed intensively on the west coast using a number of techniques like the longlines shown here and represent about 60% of the total value of farmed shellfish product.

Maintenance and expansion of this industry is currently constrained by several problems including a lack of pest control measures for two

species of burrowing thalassinid shrimp and the need to comply with federal state, and local environmental regulations concerning the impact of shellfish farming practices on the estuarine environment.

In many locations, colonization of the substrate by burrowing shrimp reduces the stability of the substrate to the extent that oysters are covered by silt and suffocate like the small oysters shown above. Where this occurs, pest control is necessary. Oyster growers in Washington State have applied the pesticide carbaryl to control shrimp for the past 40 years, but recently agreed to terminate its use by the year 2012 as part of an out-of court settlement over a permitting issue. This has clearly heightened the search for an environmentally acceptable and sustainable alternative.

The overall research objective for this project is to develop shellfish culture, pest/predator control and harvest methods which are environmentally and economically sustainable for the west coast industry. Specific short term objectives are 1) to identify critical stages in the life cycle of burrowing shrimp that are vulnerable to control measures and 2) to map oyster aquaculture operations, eelgrass beds and burrowing shrimp populations at the estuarine landscape scale and conduct a spatial analysis to quantify the interaction between oyster aquaculture practices, burrowing shrimp recruitment and movement, and fish utilization of these estuarine habitats as predators and parasite hosts. This research is conducted in support of ARS National Program 106 - Aquaculture.

We have established sampling locations and begun to examine shrimp life history patterns and monitor recruitment in several locations including Willapa Bay in Washington and Tillamook Bay and Yaquina Bay in Oregon.

Two methods of marking and tagging shrimp were evaluated in the laboratory and are being tested in the field and cages constructed to hold shrimp in the field. The age of shrimp will be estimated by quantifying the amount of a pigment called lipofuscin in their brains. This information will be extremely valuable in further defining their population dynamics and relating this to control operations in each estuary.

Aerial photographs of Willapa Bay were taken in May 2005, digitally scanned and are being ortho-rectified and processed. We have begun ground-truthing the photos for eelgrass presence and are mapping the distribution of burrowing shrimp using a hovercraft to access the broad tidal flats and GPS receivers to record position information and other field collected data. Separate layers showing tideland ownership (shellfish beds as shown above), eelgrass, and burrowing shrimp distribution will then be overlaid and data spatially analyzed to detect trends.